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ABSTRACT

Because audio-visual information is pervasive in contemporary cultural communications, this study looked at the importance of audio-visual information and how it can be used for educational purposes. Specifically, the study compared the effectiveness of audio-pictorial slide-tape presentations and printed verbal language selections as stimuli for creative thinking at the invention stage of writing. The most important focus was on whether or not low verbal eighth grade students who have difficulty reading would improve in written creative expression when their thinking is stimulated through viewing or hearing information. Although there were no statistically significant results on standardized tests, judges' ratings of creative thinking in students' written products showed improvement on the part of low verbal students. Based on this improvement and on an extensive review of literature, the study encouraged further investigation of the linguistic importance of pictorial imagery in modern culture and of its viability as a tool for teaching traditional literacy skills. (Fourteen references are appended.) (Author/SKC)

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ED289162

Effects of Verbal Ability, Audio-Pictorial Stimuli and Print-Verbal Stimuli on the Reading and Writing Abilities of Early Adolescent Students

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This research project emanated from a desire to study the educational use of images as "language," in the broad sense of language as any system of signs that communicates. The desire to look at imagery arose because of the proliferation of pictorial information and its communicative importance in our culture, some of the most prominent examples being photography, television, film, and computer. The linguistic importance of imagery lies not only in its ability for communicating information by itself, but in its interaction with traditional verbal language. Together imagery and verbal language form an integrated visual-aural language* that now carries more information in our culture than verbal language alone. The present attempt at developing theory does not postulate the demise of written verbal language, but instead focuses on its importance as a component, albeit only a component, in the context of the integrated language produced and transmitted by twentieth century communication technology.

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*See my article "The New Integrated Media Language," English Journal, February, 1978, pp. 104-107.

REVIEW OF LITERATURE AND DEVELOPMENT OF THEORETICAL BASIS

The purpose of this study and the review of the literature were to explore the use of the visual-aural media for educational purposes, particularly to develop language abilities. The study grew out of a theoretical stance which was formulated from a review of literature in the disciplines of psychology, media, imagery, and language. It was postulated that creative expression in writing is more likely to occur if the writer has access to interesting, stimulating information at the invention, or idea development, stage of writing. The major question to be answered by the study was whether low verbal students, in particular, would improve in written creative expression when their thinking is stimulated through viewing and hearing information. Since they have difficulty with reading, could information communicated in the form of visual-aural media that they understand and enjoy be a more effective linguistic alternative than verbal language alone for stimulating creative thought?

Following this theoretical stance, the experimental treatment was a comparison of visual-aural media with printed verbal language as stimuli for creative thinking at the invention stage of writing. The age level tested in the experiment was eighth grade, the age of puberty during which, according to Piaget and his work on developmental stages, children move from concrete operations to the formal, abstract thinking involved in language (Inhelder and Piaget, 1958).

One way to approach the problem of poor verbal language performance is to focus on the ablility that underlies reading and writing: thinking. Then all language experiences--photographs, television, film, computer--can be stimuli for thinking and expression, and low verbal children can be led to use productively

the language abilities they have learned from their environment. Often low verbal children have grown up in homes where they have been given few verbal language experiences to prepare them for learning to read and write; there might have been few, if any, books and magazines, or adults who were readers. In addition, the problem often seems to be compounded by the broader language experience many children do have: a captivating stream of moving lights, colors, pictures, words, and sounds untiringly produced by a TV that keeps them occupied and interested from an early age. Thus, when they begin school they have not had experiences to prepare them for the print world they encounter there, and they have difficulty learning to read. With that initial failure, their difficulties increase because most learning in school is based on the medium of printed verbal language. Instead, a more favorable situation may be created to improve thinking and writing through the acquisition of information from the media they are accustomed to and that they feel comfortable with. The assumption here is that writing improves when the writer has ideas to write about. Through audio-pictoral media, low verbal students may acquire new information to stimulate ideas which, in turn, helps create the incentive for expressing the ideas in writing.

Rather than ignore the language of the media that young school children understand, educators could instead make judicious use of the media. Verbal language might be more effectively taught through the use of the media that children are accustomed to "reading." The visual-aural media offer almost unlimited "educational" materials for presenting information to media children who have become accustomed to learning through a visual-aural perceptual approach. The presentation of information through their preferred learning modes is more likely to be of interest and therefore more likely to stimulate creative thinking, than information presented through a mode difficult for the students to understand.

In his scientific research on the nature of human intelligence, Guilford identified the area of thinking ability that he called divergent thinking (1971). Divergent thinking is virtually synonymous with what we generally call creative thinking, in the sense that creativity is the generation of varied and original ideas. Torrance developed tests--both verbal and imagistic--to measure creative or divergent thinking as Guilford had defined it (1966). Torrance's tests were used in the present study, and his criteria became the prototype for an instrument developed by the researcher to evaluate creative thinking in students' written products. Guilford's identification and definition of divergent thinking and Torrance's carefully validated tests made it possible to study the elusive quality of creativity. The concept of creativity was important to the present study because creativity is directly related to the generation of ideas at the invention stage of writing.

The present study focused on imagery as a stimulus for generating ideas to write about. Imagery has long been recognized as one of the ways humans think and it has also long been hypothesized that imagery has a special role in creative thinking and problem solving (Kosslyn, 1980). A resurgence of interest in imagery during the 1960's and 1970's, after it had been largely disregarded during the time behavioral views dominated the field of psychology, has produced a large body of material to support the importance of imagery in thinking processes. Paivo (1971) presented an extensive review of literature to support his own studies showing a relationship between imagery and verbal processes. He sees imagery and verbal langauge as alternative coding systems, both capable of concreteness and abstractness, and complementary to each other in their distinct symbolic functions.

In his study almost ten years later, Kosslyn (1980) moved toward developing a theory of the ways images serve as repositories of information in human memory. Through his research, he sought to establish scientific evidence that imagery is, along with verbal language, a major mode of information processing. Like

Paivio, he stressed the interaction of visual and verbal information, stating there is clear evidence "that verbal/abstract information may work in conjunction with depictive information in the image generation process" (p. 106). Gibson (1966) further substantiated the role of imagery in thought in his attempt to establish the senses as perceptual systems. All these studies of imagery and perception support the view that imagery surely is a means of thinking and communicating information that can be tapped for educational use.

Imagery has begun to demand attention as a linguistic phenomenon in the 20th century because, for the first time, technology is available for recording and transmitting it as a mass mode of communication. In the creating of a pervasive media consciousness in our culture, McLuhan's writing has been more instrumental than any other single influence (1964). Thus his work has significantly influenced the development of the present theoretical stance, as it was the stimulus for identifying and analyzing the characteristics of these new media, their cultural importance, and their potential as learning tools.

Bruner's work provided evidence of the strong relationship between language and learning, and he made the researcher particularly aware of the role of imagery in the early development of language ability (1967). It may be that imagery is basic to and underlying all language ability. If so, it is inexpedient for educators to ignore the contemporary technology that has given us new imagery-related language tools. The visual-aural integrated language of television, film, and computer gives us the capability of recording and transmitting messages that match the basic sight and sound imagery of which the brain is naturally capable of processing.

In summary, the educational theory underlying this research is that an expanded*, or broadened, view of language education allows us to incorporate into language

*See my article "Expanded Language," English Journal, January, 1980, pp. 87-89.

instruction the visual-aural integrated language of multi-media. It may be more successful than print language alone for transmitting information and for stimulating creative thought. Viewed as language experience, the media can be used as tools to teach the basic literacy skills of reading and writing.

PURPOSE OF THE STUDY

The purpose of the present study was to examine the effects of audio-pictorial and print-verbal stimuli on the divergent thinking abilities, verbal abilities, and attitudes toward reading and writing of eighth grade students. The researcher was particularly interested in finding out whether or not the use of audio-pictorial media could influence the writing abilities of low verbal students.

DEFINITION OF TERMS

Audio-pictorial stimuli used as experimental treatments were a combination of picture and sound media, such as slides with accompanying tapes of music, sound effects, and spoken verbal language.

Print-verbal stimuli were copies for the subjects of printed verbal language selections to be read silently rather than heard in spoken form.

Divergent thinking was defined as "The generation of logical alternatives from given information, where the emphasis is upon variety, quantity, and relevance of output from the same source" (Guilford and Hoepfner, 1971).

The period of adolescence covers the physical phenomena of pubescence (the characteristic group of bodily changes associated with human sexual maturation) as well as all the behavioral, emotional, social, and personality changes occuring during this developmental period (Ausubel, 1954).

Low verbal ability was established by the Gates-MacGinitie Reading Test; the lowest half of the subjects were assigned to the low verbal group.

RESEARCH QUESTIONS

The following research questions were later incorporated in the null hypotheses:

(1) Are audio-pictorial stimuli more effective in fostering divergent thinking than print-verbal stimuli?

(2) Is there a difference between the effect of audio-pictorial stimuli and print-verbal stimuli on the divergent thinking abilities of high verbal subjects and of low verbal subjects?

(3) Do low verbal subjects grow more in divergent thinking abilities in response to audio-pictorial stimuli than to print-verbal stimuli?

(4) Do low verbal subjects grow more in verbal abilities in response to audio-pictorial stimuli than to print-verbal stimuli?

(5) Does exposure to audio-pictorial stimuli have a more positive effect on attitudes toward reading and writing than exposure to print-verbal stimuli?

(6) Do subjects given either of the experimental treatments (audio-pictorial or print-verbal stimuli) grow more in divergent thinking abilities, verbal abilities, and positive attitudes toward reading and writing than a control group which receives no training?

RESEARCH DESIGN

Audio-pictorial stimuli were administered to one experimental group, and print-verbal stimuli to the other experimental group; both groups were asked to express their responses in writing for comparison of divergent thinking. The experimental groups were also compared with a control group which received

traditional English instruction. Pretests and posttests of verbal ability, writing, creative thinking, and attitude toward reading and writing were administered to the experimental and control groups.

A factorial design was chosen for the study in order to take into account interaction effects and thus to gain a maximum amount of information. The 2x2x2x8 factorial design included the following variables (see Figure 1).

A. Two administrations of pretests (A1) and posttests (A2).

B. Two levels of verbal ability: high verbal ability (B1) and low verbal ability (B2).

C. Two experimental treatments: audio-pictorial stimuli (C1) and print-verbal stimuli (C2).

D. Eight repeated measures (D1 through D8) on written assignments from experimental treatments.

A1 pretests			D1	D2	D3	D4	D5	D6	D7	D8	A2 posttests
	B1 High Verbal	C1 A-P	B1C1	B1C1	B1C1	B1C1	B1C1	B1C1	B1C1	B1C1	
		C2 P-V	B1C2	B1C2	B1C2	B1C2	B1C2	B1C2	B1C2	B1C2	
	B2 Low Verbal	C1 A-P	B2C1	B2C1	B2C1	B2C1	B2C1	B2C1	B2C1	B2C1	
		C2 P-V	B2C2	B2C2	B2C2	B2C2	B2C2	B2C2	B2C2	B2C2	

Figure 1

2x2x2x8 Factorial Design

The repeated measures on students' writing were used to produce a profile of the experimental groups' performance in a graph showing their progress from one trial to another (see Figures 3 and 4).

Following Edwards' (1968) suggestion, the organismic variables of high and low verbal ability were related to the underlying theory, which asserted that low verbal students would perform with more creative ideas when they were presented with audio-pictorial stimuli. As it is impossible to randomly assign subjects to this variable, they were randomly assigned within the sub-levels of low and high verbal ability.

POPULATION

The study was conducted in a middle to upper-middle class school in a satellite town of Columbia, South Carolina. The study's population of 198 eighth-grade students consisted of two teacher-student team groups, one for the experimental groups and the other for the control groups.

The organization of the school was based on teams: each group of approximately 100 students was taught core subjects by a team of four teachers, one of whom was an English teacher. The teacher-student team groups were similarly balanced in high, average, and low ability students based on their I.Q. scores. The school registration procedures assured random assignment to teacher-student groups.

MEASURING INSTRUMENTS

A. Gates-MacGinite Reading Test

The Gates MacGinitie Reading Test was used for two purposes: (1) to measure subjects' verbal ability for assignment to the high verbal and low verbal experimental groups and (2) as a pretest and posttest measure of verbal ability.

B. Torrance Tests of Creative Thinking

The Torrance Tests of Creative Thinking (Verbal Forms A and B and Figural Forms A and B) were used as pretest and posttest measures of divergent thinking ability. Based on Guilford's long-term research on divergent thinking, the Torrance tests were the most carefully validated tests of divergent thinking available.

The Torrance tests were chosen also because their author had prepared a relatively clear and thorough manual of directions for scoring them. Two scorers were carefully trained by the researcher in the present study to follow Torrance's manual in scoring the tests for the experiment. The subjects' responses on these tests are measured in terms of fluency, flexibility, originality, and elaboration.

C. Guilford Theme Test

The Guilford Theme Test, used as pretest and posttest, measured elaboration of ideas in number of words written on a specified topic. It was selected from the Kit of Reference Tests for Cognitive Factors (French, Edstrom, and Price, 1963).

D. Likert Scale on Attitudes toward Reading and Writing

As there were no measures available for evaluating attitudes toward reading and writing, the researcher constructed a Likert Scale on Attitudes toward Reading and Writing to use as pretest and posttest measures. Items were formulated on the basis of empirical observations of the researcher after thirteen years of experience in teaching reading and writing to adolescents. The scale consisted of twenty items, and subjects were asked to indicate the extent, along a seven-point scale, to which each item applied to their attitude or feeling. Half of the items pertained to reading and half to writing.

As suggested by Muzafer and Carolyn Sherif, an equal number of pro and con statements were included (1969).

E. Divergent Thinking Rating Scale

The researcher constructed an eleven point Divergent Thinking Rating Scale to measure changes in divergent thinking ability in students' written products from the eight experimental treatments.

To maintain consistency of measurement among the criterion measures used in the study, the researcher followed Torrance's and Guilford's criteria for measuring divergent thinking: fluency, flexibility, originality, and elaboration. Using the Divergent Thinking Rating Scale, a team of three experienced teachers rated the student's written products. Raters were carefully trained to understand and recognize the criteria; to read holistically; and to avoid problems encountered in using a rating scale, such as leniency, halo effect, proxemity and logical errors, and error of central tendency (Torrance, 1966).

Multiple correlation coefficients showed that scores of the Divergent Thinking Rating Scale were highly correlated with the Torrance Verbal Test of Creativity, the Guilford Theme Test, and the Likert Scale on Attitudes toward Reading and Writing. Correlation coefficients also showed a significant correlation for interrater reliability between Rater 1 and Rater 3. As there was a significant negative correlation of Rater 2 with Raters 1 and 3, scores by Rater 2 were omitted.

Figure 2 shows the schedule of administration of the tests and the experimental treatments over the period of sixteen days.

EXPERIMENTAL PROCEDURE

A. Experimental Treatment Groups

The audio-pictorial and print-verbal experimental groups consisted of one of the student-teacher teams, of which 118 subjects actually completed

Session	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Written Product					X	X	X	X	X	X	X	X				
Gates-MacGinitie Reading Test	O												PX			
	PC												PC			
Torrance Figural Test of Creativity		PX												PX		
		PC												PC		
Torrance Verbal Test of Creativity			PX												PX	
			PC												PC	
Guilford Theme Test				PX												PX
				PC												PC
Likert Scale on Attitudes toward Reading and Writing				PX												PX
				PC												PC

X = Experimental Group Measure
C = Control Group Measure
P = Pretest, Posttest
O = Measurement to Classify Organismic Variables

Figure 2

Data Collection Plan

all the tests and experimental treatments. The English teacher's class periods were used for administering the testing and treatments. Each English class was tested first on the Gates-MacGinitie Reading Test. From this test a verbal ability score was obtained and used to divide subjects into high verbal and low verbal groups, the top half forming the high verbal group and the botton half the low verbal group. Then, half of each verbal ability group were assigned to the experimental group to receive audio-pictorial treatment and the other half to receive print-verbal treatment. Assignment to the treatment groups was random.

B. Description of Treatments

The experimental group was divided into two sub-groups, one of which received stimulus material in the form of audio-pictorial media and the other which received print-verbal media. The audio-pictorial media consisted of slide-tape presentations, including pictures, music, sound effects, and spoken verbal language.

Each of the audio-pictorial presentations was matched as nearly as possible in subject matter with print-verbal selections. For instance, a slide-tape presentation of Lou Rawls singing "Ole Man River" was matched with an excerpt from Huckleberry Finn describing the river. The reading selections constituted the experimental treatments for the other experimental group. After the administration of the experimental treatment, all the subjects in both groups were given the same writing assignment, which was written out ahead of time and read to the subjects. They were instructed to write as many ideas on the topic as they could in a twenty minute period.

To give continuity to the type of writing required, the writing assignments were developed around two basic writing exercises: half of the writing assignments were concerned with "expanding ideas" and the other half with "exploring yourself and your ideas." Instructions for writing assignments were patterend after Freud's free association technique: the subjects were asked to place their minds in a relaxed, uncritical state and were then instructed to report their

thoughts in response to the stimuli. They were urged to report every thought regardless of its implications, apparent relevance, logic or propriety (Horowitz, 1970).

C. Teaching Procedures

A total of eight trial sessions in writing were held for the experimental groups. The stimuli were presented separately to each of the experimental groups. Those who received print-verbal stimuli were taken by the English instructor to a separate classroom, and there they were given the print-verbal selection to read. Meanwhile the group receiving audio-pictorial stimuli remained in their regular classroom where the researcher operated the audio-visual equipment to present the packaged audio-pictorial stimuli. Each group was given twenty minutes for the stimulus, and then each group was read the writing assignment and allowed twenty minutes to write their ideas pertaining to the stimuli and the writing assignment,

The treatments were presented on eight consecutive school days. At the beginning of each day the researcher held a ten-minute session with the English instructor, when he was given the print-verbal materials for the day and a printed copy of the writing assignment to read to the subjects.

D. Control Group

The control group consisted of a student-teacher team similar to that of the experimental groups of which 80 subjects completed the pretests and posttests. Like the experimental groups, the control group was assigned to high verbal and low verbal subgroups on the basis of the Gates-MacGinitie Reading Test scores. In the control group, the pretests and posttests were administered during the social studies teacher's class periods. This allowed the control group subjects to continue participating in their regular eighth grade English classes.

NULL HYPOTHESES

Out of the research questions presented earlier were generated the null hypotheses to which the statistical analyses that follow were applied.

(1) There is no difference in change of divergent thinking between the experimental group which received audio-pictorial stimuli and the experimental group which received print-verbal stimuli.

(2) There is no interaction effect on divergent thinking of verbal ability (high or low) and type of stimuli received (audio-pictorial or print-verbal).

(3) There is no interaction effect of verbal ability (high or low) and group (control, audio-pictorial experimental, or print-verbal experimental) on divergent thinking ability.

(4) There is no interaction effect on initial verbal ability (high or low) and type of stimuli received (audio-pictorial or print-verbal) on change in verbal ability.

(5) There is no interaction effect of initial verbal ability (high or low) and group (experimental or control) on change in verbal ability.

(6) There is no interaction effect of verbal ability (high or low) and type of stimuli received (audio-pictorial or print-verbal) on attitudes toward reading and writing.

(7) There is no interaction effect of verbal ability (high or low) and group (audio-pictorial experimental, print-verbal experimental, or control) on attitudes toward reading and writing.

STATISTICAL ANALYSES OF DATA

The statistical analyses of data to determine the relationship between organismic classification variables (high or low verbal ability), experimental variables (audio-pictorial or print-verbal), and criterion variables (all tests

used) were as follows:

(1) A three-way experimental group versus control group analysis of variance to determine the difference between experimental and control groups on criterion variables;

(2) A three-way analysis of variance to determine the difference between the two experimental groups on all criterion variables;

(3) A three-way repeated measures analysis of variance to determine the difference between the two experimental groups on judges' ratings of eight student-written products;

(4) A multiple r to determine correlation coefficients of criterion variables and judges' ratings of eight sets of student-written products;

(5) A multiple r correlation to determine interrater reliability of the three judges' ratings of eight sets of student-written products; and

(6) Newman-Kuhls teststo ascertain which of the means of judges' ratings of eight sets of student-written products were significant.

DISCUSSION OF RESULTS

Statistical analyses with a significance level of .05 determined that all the null hypotheses had to be accepted. No consistent statistically significant results were shown for any of the criterion measures. However, some trends warrant discussion. Though all the standardized tests showed very little change from pretest to posttest, judges' ratings of two of the eight student-written products did reveal significant results. With this result in mind, the researcher concluded that a standardized verbal testing situation isaless stimulating environment for creative, divergent thinking. It has too many negative associations for many students, especially those who are

low in verbal ability, to elicit their best performance. The experimental treatments, on the other hand, were a more positive situation for learning. In these cases, interesting stimuli were presented, and time was given for subjects to express their own thoughts in writing. As creative thought is more likely to occur when a person is stimulated and involved in his or her personal expression, the researcher believed that the judges' ratings of written products were a more valid measure of creative thinking than standardized verbal tests.

The analysis of variance figures appear in table 1. Table 2 and Figure 3 show that, on judges' ratings of divergent thinking in students' written products, the audio-pictorial group started with a somewhat lower score than the print-verbal group, but the audio-pictorial group improved thereafter and consistently outperformed the print-verbal group. Newman-Kuhls tests showed a significant difference at the .05 level of significance on sessions 9 and 11.

Table 3 and Figure 4 present the same data broken down to show the differences between high and low verbal, and audio-pictorial and print-verbal groups. Figure 4 shows that the high verbal audio-pictorial group outperformed the high verbal print-verbal group, and similarly, the low verbal audio-pictorial group outperformed the low verbal print-verbal group. Also, it can be noted that in one instance (session 11) the low verbal audio-pictorial group outperformed even the high verbal print-verbal group.

The significant results on two of eight student-written products shown in Figure 3 and 4 suggested to the researcher that audio-pictorial information might be more effective than print-verbal for stimulating divergent thinking in low verbal students. Over a longer period of time, more consistently significant results might have been attained, as abilities so complex as thinking and writing need a longer period of time for development.

TESTS	SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB F
Numerator	Verb	1	3232.9855	3231.98546	10.20345	**0.0022
Denominator	Sub (Verb Group)	115	36426.7451	316.75431		
Numerator	Group	1	762.3625	762.36251	2.40679	0.1195
Denominator	Sub (Verb Group)	115	36426.7451	316.75431		
Numerator	Verb*Group	1	-5.1456	-5.14561	-0.01624	1.0000
Denominator	Sub (Verb Group)	115	36426.7451	316.75431		
Numerator	Time	7	685.6615	97.95164	1.89017	0.0676
Denominator	Sub*Time(VerbGroup)	805	41716.3009	51.82149		
Numerator	Verb*Time	7	1199.4604	171.35149	3.30657	**0.0021
Denominator	Verb*Time	805	41716.3009	51.32149		
Numerator	Group*Time	7	1428.3037	204.8037	3.93881	***0.0005
Denominator	Sub*Time(Verb Group)	805	41716.3009	51.82149		
Numerator	Verb*Group*Time	7	586.0547	83.72210	1.61559	0.1268
Denominator	Sub*Time(Verb Group)	805	41716.3009	51.82149		

**Significant at the p .01 level
***Significant at the p .001 level

Tabel 1

Summary of repeated measures analysis of variance on divergent thinking as measured by judges' ratings of divergent thinking in eight student written products

GROUPS	Trials								GROUP MEAN
	1	2	3	4	5	6	7	8	
Audio-Pictorial Mean	18.8728	21.0084	20.8644	19.2542	22.1779	18.5847	21.7372	20.1101	20.3262
Print-Verbal Mean	19.2833	20.2833	20.4916	18.7500	16.1500	17.7583	15.7833	19.7916	18.5364
TRIAL MEAN	19.0780	20.6458	20.6780	19.0021	19.1639	18.1715	18.7602	19.9508	

Table 2

Cell means, group means and trial means for audio-pictorial and print-verbal groups on divergent thinking in eight student written products

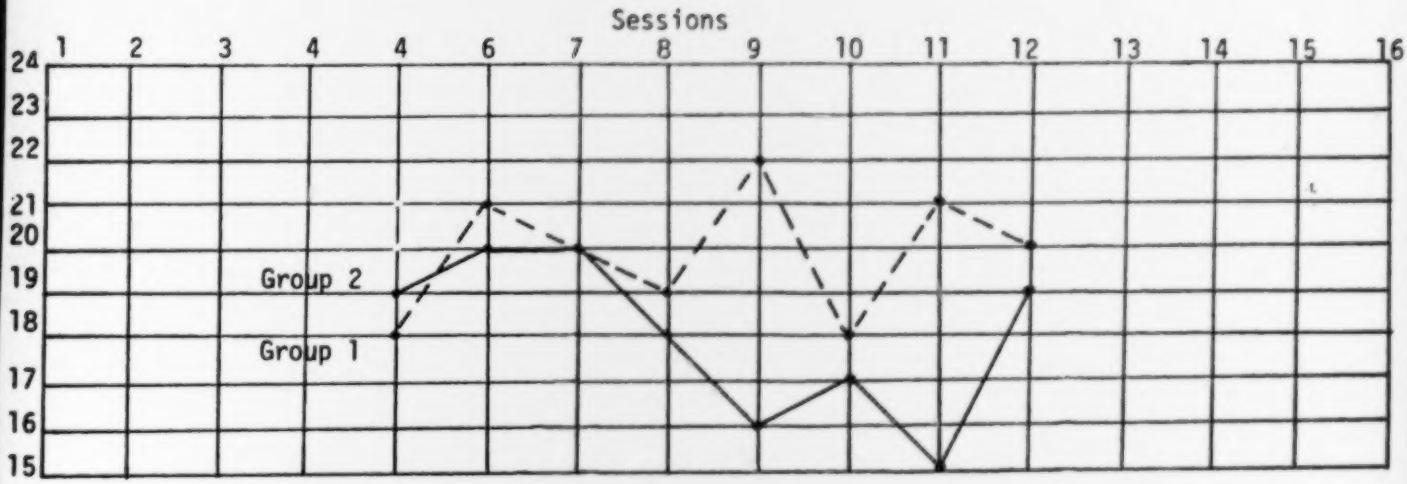


Figure 3

Profile of scores of audio-pictorial and print-verbal groups on divergent thinking in eight student written products

Group 1 = Audio-pictorial, N = 59
Group 2 = Print-verbal, N = 60

VERBAL ABILITY	TYPE OF STIMULI	Sessions								GROUP MEANS
		5	6	7	8	9	10	11	12	
High	Audio-pictorial	20.1290	23.9838	22.4677	19.9612	24.8548	20.4032	21.0322	23.3548	21.9233
Verbal	Print-Verbal	22.1451	23.8387	23.7741	19.3387	18.4516	20.1129	16.2419	19.7580	20.4576
Low	Audio-pictorial	17.4821	17.7149	19.0892	19.3571	19.2142	16.5714	22.5178	16.5178	18.5579
Verbal	Print-Verbal	16.2241	16.4827	16.9827	18.1206	13.6896	15.2413	15.2931	19.8275	16.4827
TRIAL MEANS		18.9950	20.5048	20.5684	18.9944	19.0593	18.0822	18.7712	19.8645	

Table 3

Cell means, group means and trial means for high and low verbal, audio pictorial and print-verbal groups on judges' ratings of divergent thinking of eight student written products

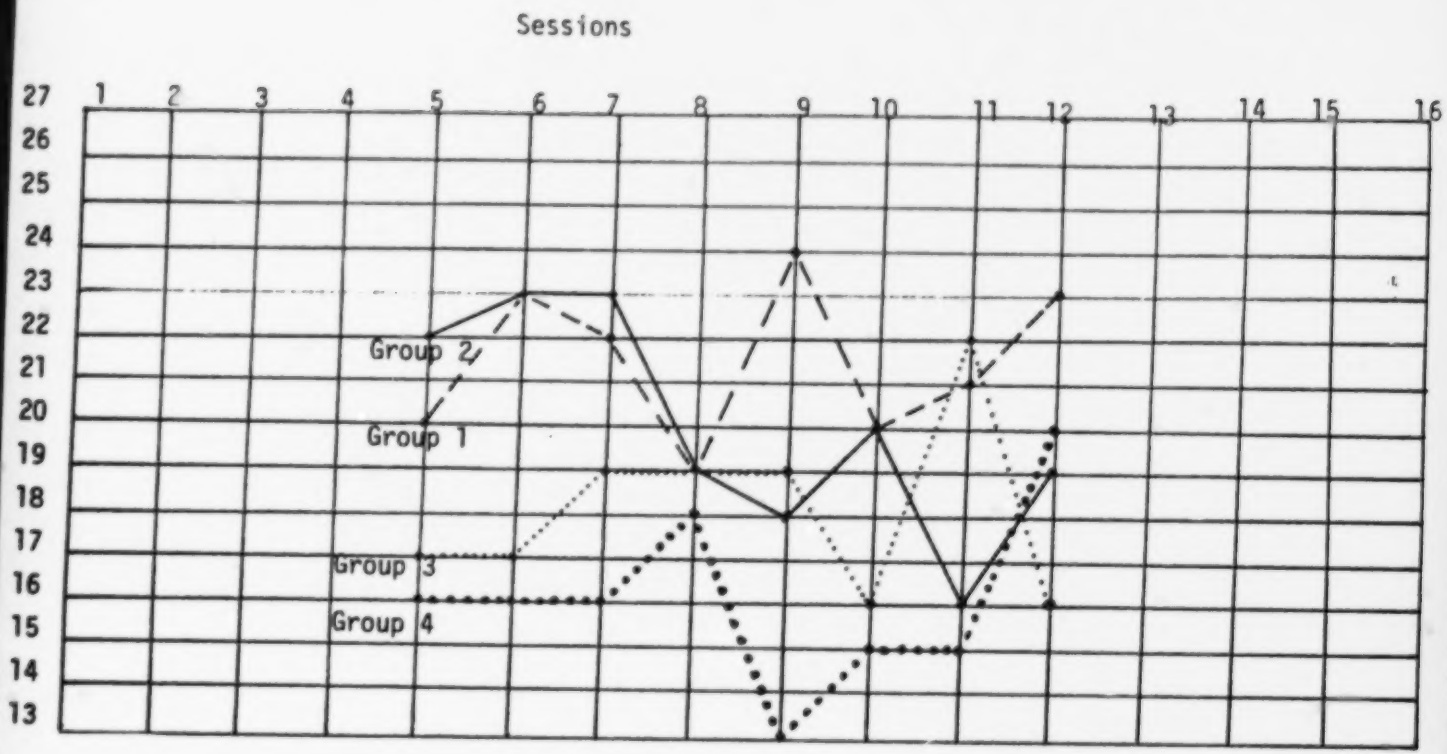


Figure 4

Group 1 = H-V, A-P, N = 31
Group 2 = H-V, P-V, N = 30
Group 3 = L-V, A-P, N = 28
Group 4 = L-V, P-V, N = 39

Profile of means on divergent thinking of high verbal and low verbal, audio-pictorial and print-verbal groups on judges' ratings of eight student written products.

The only standardized test on which low verbal students improved from pretest to posttest, although not statistically significant, was the Torrance Figural Test of Creativity (Table 4 and Figure 5). All low verbal subjects, in both the experimental and control groups, showed a more pronounced rise in scores than the high verbal groups. As there was little change in other test scores from pretest to posttest, this change probably was not due to research treatment, but it is more likely that subjects improved as a result of experience in taking the test, which was an unusual test for them.

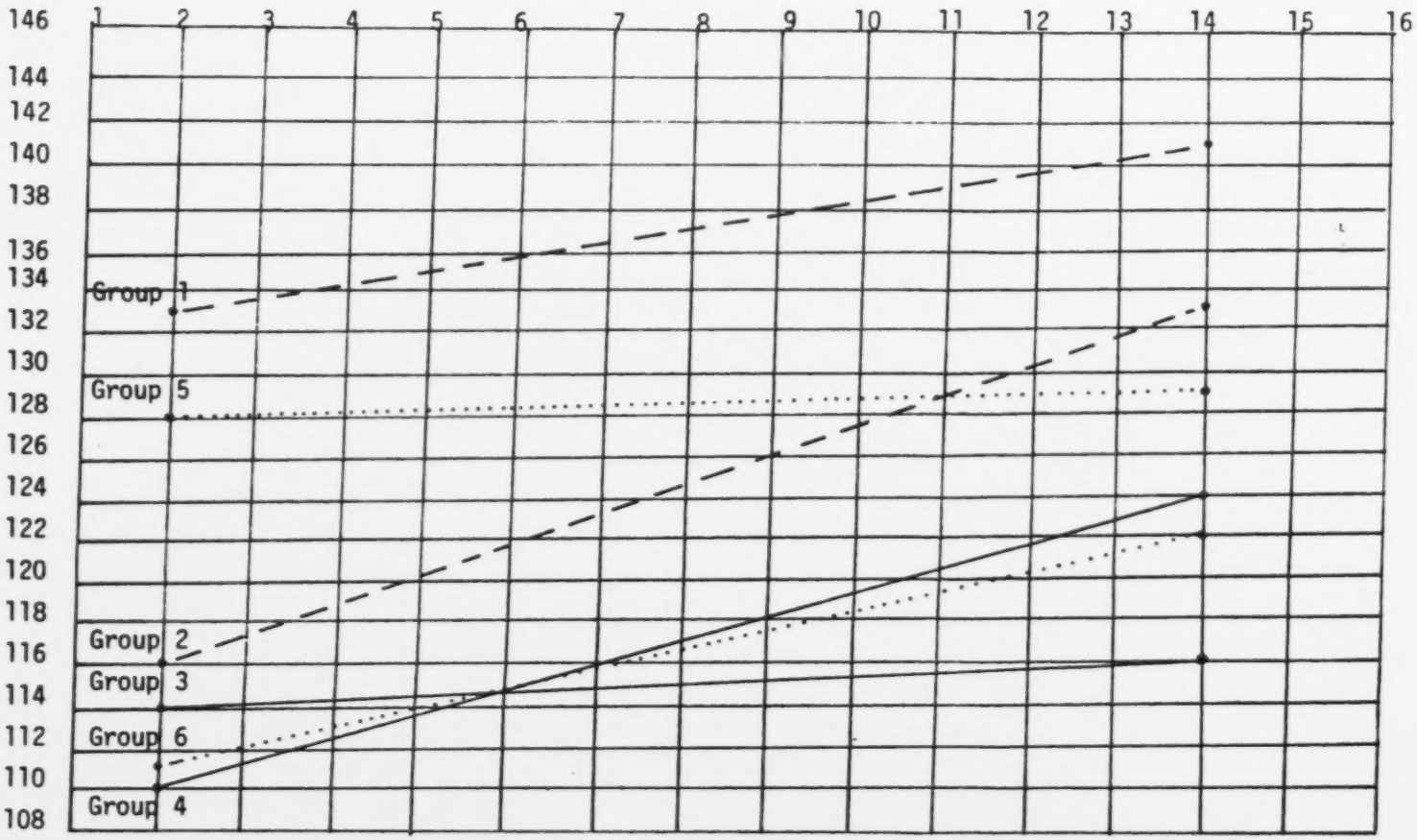
One might speculate, based on Guilford's model of divergent thinking, that different kinds of creative thinking are operating, and that low-verbal students might be able to develop divergent thinking in some mode of expression other than written verbal language. Divergent thinking ability underlies all forms of expression, and an individual might have more of an affinity for expression in one mode than in another. And, if divergent thinking can be taught and practiced through expression in any mode, the individual might have a better chance of gaining insight into the basic ability of thinking and then learning to express it through different communication modes. Also, low verbal students might have responded better on the Torrance Figural Test because it provided a thinking outlet for them that was less discouraging than the typical demand for expression in verbal language.

In retrospect, the researcher had wondered whether the Gates-MacGinitie Reading Test was valid for separating high verbal and low verbal subjects because the testing of divergent thinking was analyzed in subjects' written products, which is a different aspect of verbal ability than reading. However, a multiple r correlation on the test showed that the Guilford Theme Test, a written product, was highly correlated with the Gates-MacGinitie Reading Test. Since the Guilford Theme Test was similar in nature to the students'

TEST	SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB > F
Numerator	Verb	1	1551.981	1551.98099	0.69100	0.5874
Denominator	Sub (Verb Group)	115	258287.692	2245.97993		
Numerator	Group	1	2841.652	2841.65239	1.26522	0.2620
Denominator	Sub (Verb Group)	115	258287.692	2245.97993		
Numerator	Verb*Group	1	3211.369	3211.36947	1.42983	0.2323
Denominator	Sub (Verb Group)	115	258287.692	2245.97993		
Numerator	Time	1	3080.594	3080.59488	3.79657	0.0509
Denominator	Sub*Time (Verb Group)	110	89255.761	811.41601		
Numerator	Verb*Time	1	1676.555	1676.55509	2.06621	0.1497
Denominator	Sub*Time (Verb Group)	110	89255.761	811.41601		
Numerator	Group*Time	1	-20.656	-20.65613	-0.02546	1.0000
Denominator	Sub*Time (Verb Group)	110	89255.761	811.41601		
Numerator	Verb*Group*Time	1	71.746	71.74600	0.08842	0.7643
Denominator	Sub*Time (Verb Group)	110	89255.761	811.41601		

Table 4

Summary of three-way analysis of variance on divergent thinking as measured by the Torrance Figural Test of Creativity



Group 1 = H-V, Control, N = 40
Group 2 = L-V, Control, N = 40
Group 3 = H-V, A-P, N = 31
Group 4 = L-V, A-P, N = 27
Group 5 = H-V, P-V, N = 31
Group 6 = L-V, P-V, N = 29

Figure 5
Change in pretest to posttest means of high and low verbal control groups and experimental groups on the Torrance Figural Test of Creativity

written products, the researcher reasoned that its correlation with the Gates-MacGinitie indicated the validity of the Gates-MacGinitie as an instrument for separating high and low verbal subjects for verbal expression in writing.

SUMMARY OF FINDINGS

The research project was designed to study the use of audio-pictorial stimuli to increase creative divergent thought in the writing of eighth-grade adolescent students, focusing especially on subjects with low verbal ability. Though only two of eight trials showed a significant result, evaluation of divergent thinking in students' written products suggested improvement on the part of low verbal students. This was important because the actual written products were a more valid measure of creative thinking than objective tests which do not require a response to be generated, organized, and composed by the individual.

IMPLICATIONS FOR FURTHER RESEARCH

Research in education should emanate from theory, which can be developed by integrating research from several different areas that are relevant to each other. The fields of cognitive psychology, language, and art all offer rich information about the visual imagery in communication media for development of educational theory. A need exists to study the phenomenon of imagery, how it relates to learning, and how it can be used effectively in education.

Computers are the most advanced language tool for generating images. In fact, computers integrate all the modes of language: verbal language, mathematics, visual arts, and music. In a research project, the computer would be the language tool for generating and recording the subjects, expressions of their learning. Learners' language expression abilities would be measured directly in their creative products--in the different modes of the integrated language, not by printed tests. Growth would be measured over a period of at least a year.

Principles from psychology underlying the creation of a favorable learning environment would be adhered to: encouraging learners to identify and pursue subjects they find deeply interesting, and identifying individuals' learning styles so individualized learning methods can be suggested. A pleasant physical and psychological environment is highly desirable.

Future research projects need to be formulated with the purpose of evaluating educational programs. Specifically, there is a need to devise and evaluate educational programs that help students increase their intelligence through a broad study of language, in the sense that language is any communication system. This is a semiotic view of language that would encourage the study of the integrated language of the media. Such a view incorporates the exploration of imagery as a tool for developing language ability and intelligence.

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Abstract

Because aural-visual information is pervasive in our contemporary cultural communications, this study was an attempt to look at its importance and how it can be used for educational purposes. Specifically, the study was a comparison of audio-pictorial slide-tape presentations and printed verbal language selections as stimuli for creative thinking at the invention stage of writing. The most important focus was on whether or not low verbal, eighth-grade students who have difficulty reading would improve in written creative expression when their thinking is stimulated through viewing and hearing information. Although there were no statistically significant results on standardized tests, judges' ratings of creative thinking in students' written products showed improvement on the part of low verbal students. Based on this improvement and on an extensive review of literature, the study encouraged further investigation of the linguistic importance of pictorial imagery in our culture and of its viability as a tool for teaching traditional literacy skills.